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IS 1448-124 (1987): Methods of test for petroleum and its products, Part 124: Dilution of gasoline engine crankcase oils [PCD 1: Methods of Measurement and Test for Petroleum, Petroleum Products and Lubricants]

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“Knowledge is such a treasure which cannot be stolen”

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IS : 1448 [P : 124]-1987
Adopted : 30 January 1987

Indian Standard (Reaffirmed 2006)

METHODS OF TEST FOR PETROLEUM AND ITS PRODUCTS

[P : 124]

DILUTION OF GASOLINE ENGINE CRANKCASE OILS

(First Reprint AUGUST 1997)

UDC 665·6/·7 : 621·892 : 66·063·93 : 543

Adapted with permission from the Joint Publication IP23/83-ASTM D 322-80.

1. SCOPE

1.1 This method determines the amount of dilution in crankcase oils of engines when gasoline has been used as the fuel.

2. OUTLINE OF THE METHOD

2.1 The sample, mixed with water, is placed in a glass still provided with a reflux condenser discharging into a graduated trap connected to the still. Heat is applied and the contents of the still are brought to boiling. The diluent in the sample is vapourized with the water and then liquefied in the condenser. The diluent collects at the top of the trap, and the excess water runs back to the still where it is again vapourized, carrying over an additional quantity of diluent. The boiling is continued until all the diluent has been boiled out and recovered in the trap and the volume is recorded.

3. SIGNIFICANCE

3.1 Some fuel dilution of the engine oil may take place during normal operation. However, excessive fuel dilution is of concern in terms of possible performance problems.

4. APPARATUS

4.1 Flask — Round-bottomed, short-necked, having a nominal capacity of one litre. Figures 1 and 2 show recommended designs and glass connections.

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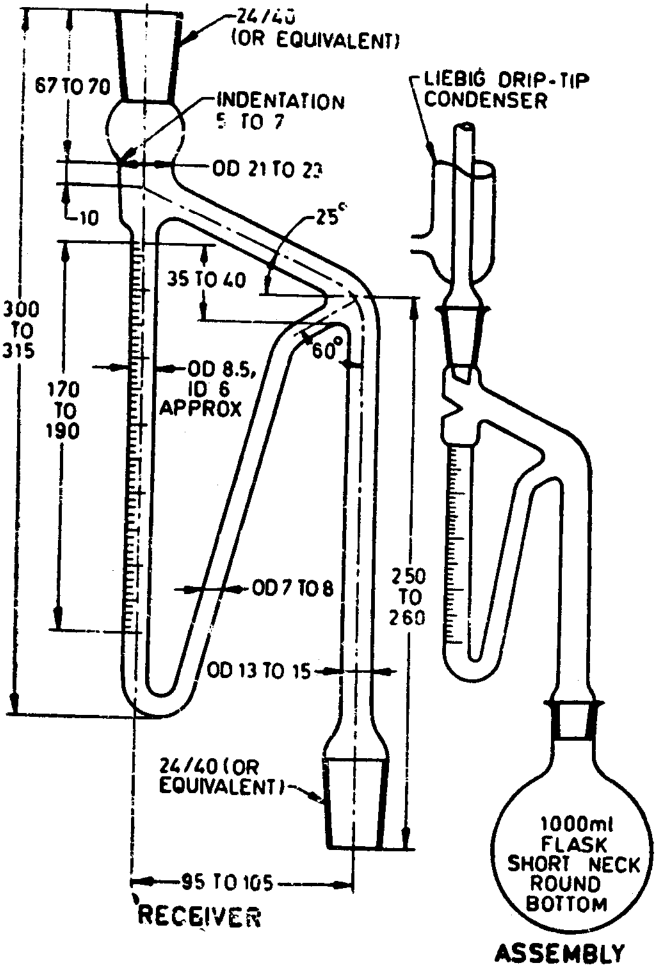
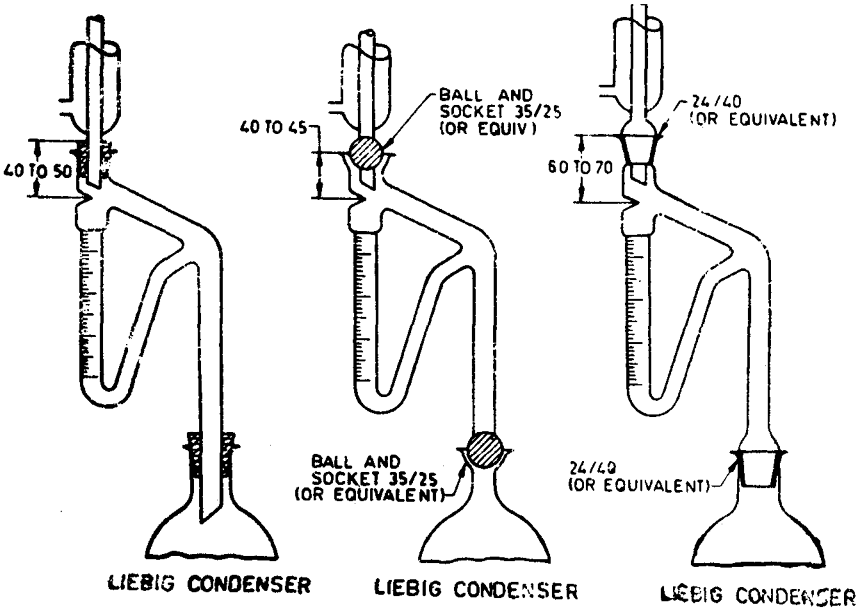


All dimensions in millimetres.

FIG. 1 APPARATUS FOR DETERMINING DILUTION OF GASOLINE ENGINE CRANKCASE OIL

4.2 Condenser — Liebig straight type with a jacket not less than 400 mm long and with an inner tube having an outside diameter of 10 to 13 mm. Figures 1 and 2 show characteristic details of suitable condensers.



All dimensions in millimetres.

FIG. 2 ALTERNATIVE CLOSURES WITH THE SAME TRAP AS SHOWN IN FIG. 1

4.3 Trap — In accordance with the details of construction shown in Fig. 1 and 2, and conforming to the following requirement:

It shall be graduted from 0 to 5 ml in 0·1 ml divisions. It shall be calibrated at four or more points by first filling it with water and then adding petroleum hydrocarbon solvent (*see* IS : 1745-1978*) or *n*-heptane from a standard burette having a calibrated capacity at least equal to that of the trap. The error of the indicated volume shall not exceed 0·05 ml.

4.4 Heater — Any suitable gas burner or electric heater may be used with the glass flask.

5. PROCEDURE

5.1 Mix the sample thoroughly, measure 25 ml by means of a 25-ml graduated cylinder and transfer as much as possible of the contents of the cylinder by pouring it into the flask. Wash the graduated cylinder with successive portions of hot water until only a negligible amount of oil is left in the cylinder. Add additional water to the flask to make a total of approximately 500 ml of water. Fill the trap with cold water and add 1 ml of ethanol to the water in the trap.

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*Specification for petroleum hydrocarbon solvent (*second revision*).

5.2 Assemble the apparatus as shown in Fig. 1, so that the tip of the condenser is directly over the indentation in the trap.

5.3 Heat the flask at such a rate that refluxing starts within 7 to 10 minutes after heat is applied, with the water and sample being at 21 to 38°C prior to application of heat. After boiling and condensation has commenced, adjust the rate of boiling so that condensed distillate is discharged from the condenser at a rate of 1 to 3 drops per second (*see* Note).

NOTE — Bumping with a tendency to froth over is often experienced with dirty oils. The use of 'boiling stones' steel wool or about 5 ml of concentrated hydrochloric acid (HCl) in the flask is often helpful in eliminating this difficulty.

5.4 Obtain readings of the amount of diluent at 5, 15 and 30 minutes from the time refluxing starts and each 15 minutes following until the test is complete. Completion of the test shall be determined on the basis of either or both of the following criteria.

5.4.1 The test is complete when the volume of diluent increases by not more than 0·1 ml in any 15 minutes period during the course of the test.

5.4.2 The test is complete when the volume of diluent obtained in a given time indicates completion, as follows:

Time From Start of Refluxing Minutes	*Test is Complete if Apparent Volume of Diluent Collected is Equal to or Less Than*
5	No visible diluent*
30	2·0 ml
60	4·0 ml
90	5·0 ml

5.5 When the test continues without reaching the limit defined in **5.4.1** to a point at which any of the conditions described in **5.4.2** are encountered, the latter shall define the completion of the test.

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*Report as 'no dilution', otherwise the test should be continued for at least 30 minutes.

5.6 When the test is complete by either of the criteria defined in **5.4.1** and **5.4.2**, turn-off the heat. Allow the equipment to stand at least 30 minutes to allow the distillate to settle clear and cool to approximately room temperature. Read the volume of diluent collected in the trap. If the volume of diluent exceeds the calibrated capacity of the trap, discontinue the test and report the results as 20 percent plus.

6. CALCULATIONS

6.1 The diluent content of the sample, expressed as volume percent is equal to the volume of diluent in millilitres multiplied by 4 (*see* Note).

NOTE — In some cases with samples containing large amounts of diluent, equipment limitations do not permit collection and measurement of the full 5 ml of diluent even when more is present. This condition exists when the upper limit of the collected diluent is above the zero calibration mark on the trap. When it occurs, finish the test as prescribed in **5.6** read the maximum volume of diluent collected, calculate the corresponding percentage, *x*, and report the results as '*x* percent plus'.

7. REPORT

7.1 Report the result as the diluent content.

8. PRECISION

8.1 Result of duplicate tests shall not differs by more than the following amounts:

Repeatability	*Reproducibility*
0·6 percent	1·4 percent

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